

Appln No. 09/703,264

Amdt date January 14, 2005

Reply to Office action of November 2, 2004

**REMARKS/ARGUMENTS**

Claims 1-39 are pending in this application. None of the claims have been amended herein.

Claims 11-32 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. Specifically, the Office action alleges that "a single adaptive filter" is not disclosed in the specification. However, the "single adaptive filter" of the present invention is described throughout the specification. For example, "FIG. 5 is a simplified block diagram of an echo canceller having a single adaptive filter designed to adapt in the presence of a secondary audio tone in accordance with an exemplary embodiment of the present invention" (page 4, lines 16-19); "The combined reference signal 237(a) may then be input into a single 8 kHz adaptive filter 200 rather than using two adaptive filters . . . .Therefore, the described exemplary embodiment requires less memory and processing resources" (page 7, lines 23-28); and "The combined reference signal 301(a) may then be input into a single 8 kHz adaptive filter 200 rather than using two adaptive filters, one at 8 kHz and the other at 48 kHz as described in connection with FIG. 5. Therefore, the described exemplary embodiment requires less memory and processing resources" (page 14, lines 17-22), underlining added.

With respect to the cited transfer functions of FIG. 8, the specification clearly mentions that "the [single] adaptive filter models in parallel the transfer functions of each of the three possible echo paths. Specifically, the adaptive filter models the transfer function 400 of the electrical echo path

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resulting from reflections of the far end voice created by the impedance mismatch at the two-four wire conversion in the hybrid. The adaptive filter also models the transfer function of the acoustic echo path 402 between the secondary audio signal being broadcast by speaker 328 and the microphone 330 as well as the transfer function of the acoustic echo path 404 between the speaker 329 broadcasting the far end voice signal and the microphone 330." (Page 15, line 28 to page 16, line 5, emphasis added). Therefore, the claimed "single adaptive filter" is fully supported in the specification. Accordingly, it is respectfully requested that the above rejections be withdrawn.

Claims 1-3, 6, 8-10, 33, 36 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eppler Jr. et al (US 5,600,714), in view of Finn (5,706,344). Claims 4, 35, and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eppler and Finn as applied to claims 1, 33, and 37, and further in view of Sih (US 5,732,134). Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Eppler and Finn as applied to claim 1 above, and further in view of Sellenslagh et al. (US 3,433,898). Claims 7, 34, and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eppler and Finn as applied to claims 1, 6, 33, and 37, and in further view of Hasegawa (US 5,905,717). Applicants submit that all of the pending claims in this application are patentable over the cited references, and reexamination and reconsideration of the rejections and allowance of this application are respectfully requested.

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As discussed in the previous Amendment of July 15, 2004, Eppler does not disclose nor does it suggest a "single adaptive filter". Rather, the system of Eppler requires two echo cancellers each including a filter. Therefore, the system of Eppler requires two filters, one for acoustic noise and one for line signal. A room acoustic echo canceller (24 in Fig. 1) "compares the output of amplifier 76 to the signal picked up by microphone 12, producing a different signal which is sent to room acoustic echo canceller 24. This allows echo canceller 24 to continually adjust parameters, that is to say, to continually adjust the amplitude of the echoes until a set of amplitudes for each of the echoes is reached which allows the white noise signal output by speaker 58 . . . " (Col. 8, lines 8-16, emphasis added). Therefore the echo canceller 24 includes a filter for acoustic signals for "continually adjust[ing] the amplitude of the echoes."

In addition to the echo canceller 24, the system of Eppler requires a second echo canceller. That is the Line Hybrid echo canceller (46 in Fig. 1) for canceling the echo in the line, that is far end signal. The "room acoustic echo canceller 24 and the line hybrid echo canceller 46 are trained during installation for an initial set of scaling parameters corresponding to the user's room and the telephone line, and these scaling parameters are the starting point for the system each time the system is turned on." (Col. 7, lines 47-53). As a result, the Line Hybrid echo canceller 46 also includes a filter for filtering the line signal. Therefore, it is clear that the system of Eppler includes two filters.

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In fact, Eppler emphasizes that Hybrid echo canceller 46 "which is illustrated in FIG. 2 in and of itself forms no part of the present invention and is well known in the art and commercially on the market in the form of the above-referenced Motorola integrated circuit, which appears as a single chip 70 as illustrated in FIG. 1." (Col. 6, lines 47-51.)

Similarly, Finn discloses at least two filters; each of the acoustic echo cancellers 36 and 60 have a filter. That is, the acoustic echo canceller 36 "is preferably an adaptive finite impulse response filter having sufficient tap length to model the acoustic path." (Col. 3, lines 43-44). "The far-end acoustic echo canceller 60 preferably operates in a manner similar to the near-end acoustic echo canceller 36. The far-end acoustic echo canceller 60 inputs the combined near-end voice and audio signal from signal sensor 50 through lines 51 and 106. The acoustic echo canceller 60 is preferably an adaptive finite impulse response filter having sufficient tap length to model the acoustic path." (Col. 4, lines 51-58).

In contrast, the present invention uses "a single adaptive filter" which "models in parallel the transfer functions of each of the three possible echo paths and which "requires less memory and processing resources." (Id.). Applicants respectfully disagree with the assertion that "each transfer function [of FIG. 8] is a separate filter. As mentioned above, FIG. 8 simply illustrates "a single adaptive filter" which "models in parallel the transfer functions of each of the three possible echo paths" and not three (or two) adaptive filters, as required in the systems of Eppler or Finn.

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Therefore, neither Eppler nor Finn, alone or in combination, teach or disclose "a single adaptive filter having filter coefficients adapted to cancel an echo in a near end signal, the echo comprising at least a portion of a far end telephony signal and at least a portion of a secondary audio signal," as recited by claim 1. Accordingly, independent claim 1 is patentable over the cited references.

Independent claim 11 recites "a single adaptive filter having filter coefficients adapted to cancel an echo in a near end signal, the echo comprising an acoustic echo and an electrical echo." As discussed above, neither Eppler nor Finn, alone or in combination, teach or disclose the above limitation. Thus, independent claim 11 is patentable over the cited references.

Independent claim 22 includes, among other limitations "the second telephony comprising a single adaptive filter having filter coefficients adapted to cancel an echo in a near end signal, the echo comprising an acoustic echo and an electrical echo." As discussed above, neither Eppler nor Finn, alone or in combination, teach or disclose the above limitation. Therefore, independent claim 22 is also patentable over the cited references.

Independent claim 33 includes, among other limitations "adaptively filtering the reference signal by a single adaptive filter." As argued above, neither Eppler nor Finn, alone or in combination, teach or disclose the above limitation. Consequently, independent claim 33 is also patentable over the cited references.

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Independent claim 37 includes, among other limitations "a single adaptive filter for adaptively filtering the reference signal " As discussed above, neither Eppler nor Finn, alone or in combination, teach or disclose the above limitation. Thus, independent claim 37 is also patentable over the cited references.

In short, the independent claims 1, 11, 22, 33, and 37 define a novel and unobvious invention over the cited references. Thus, these claims are allowable over the cited references. Dependent claims 2-10, 12-21, 23-32, 34-36, and 38-39 are dependent from these independent claims, respectively and include all the limitations of their respective independent claims and additional limitations therein. Accordingly, these claims are also allowable over the cited references, as being dependent from allowable independent claims and for the additional limitations they include therein.

In view of the foregoing amendments and remarks, it is respectfully submitted that this application is now in condition for allowance, and accordingly, reexamination and allowance are respectfully requested.

Respectfully submitted,  
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